

Description

Surface Cleaning Device

TECHNICAL FIELD

[0001] The present invention generally relates to vacuum cleaner accessories and more particularly to hand held vacuum nozzles commonly used for surface, carpet, and upholstery cleaning on a selected profile surface.

BACKGROUND OF INVENTION

[0002] Typically, carpeted or uncarpeted stairs and furniture upholstery have been vacuumed and / or cleaned by a combination of vacuum and solution cleaning processes using a relatively small hand-held suction nozzle of approximately 6 inches in width. The nozzle is typically connected by a flexible hose to a vacuum source such as a vacuum cleaner or a steam / solution cleaner. However, when vacuum cleaning or utilizing the steam / solution cleaning process in combination with a vacuum it is typically difficult to adequately clean a specific or selected profile surface such as a sharply curved convex / concave surface,

for example the toe or corner of a step or an upholstery arm due to the typically long straight suction inlet of the vacuum cleaner nozzle.

[0003] This problem has been recognized in the prior art, for example in U.S. Patent No. 6,401,296 B1 to McKnight et al., disclosed is a removable suction nozzle to convert the suction inlet of a vacuum cleaner from a straight surface to either a concave or convex surface for vacuuming carpet with matching concave or convex surfaces, such as stair steps, reference Figure 8. McKnight et al. also discloses the use of the nozzle to be used with a hand held hot water extractor having spray guide grooves and strakes to direct the spray toward the suction. However, McKnight et al. does not disclose a "U" shaped opening and primarily utilizes a single attachment head having a rotatable chamber or a double ended attachment head with both concave and convex surfaces. Similarly, in U.S. Patent No. 6,038,732 also to McKnight et al., comprises a divisional patent of the aforementioned McKnight et al. patent being U.S. Patent No. 6,401,296 B1 and thus having the same disclosure, teaches the same suction nozzle configurations.

[0004] Another approach in the prior art that is somewhat more

specialized is in U.S. Patent No. 6,029,310 to Besel that discloses a wand for vacuuming stairs with a nozzle bar for applying a liquid cleaning material within a vacuum slot; the wand vacuum slots are length adjustable to conform to a stair step run length and terminate just around the corner of the run forming a half "U" section. An elongated vacuum tube is utilized to allow the operator to stand erect while using the wand and not having to kneel down, however, it appears that the wand misses the lower and middle portion of the stair rise for cleaning and cannot clean around a toe portion of the step. An alternative approach is in U.S. Patent No. 5,502,070 to Ragner et al. that discloses a multiple function vacuum cleaner nozzle having two straight pivotal cleaning arms that are adjustable in relation to each other. Each cleaning arm has a hollow cleaning channel with a row of bristles on each channel edge; the arms are movable through a total range of 180 degrees from being a straight line and to being parallel to each other. Thus, Ragner et al. could be used on stairs, however, would not be able to accommodate the run toe overhang for cleaning. In addition, Ragner et al. does not disclose anything pertaining to solution cleaning in conjunction with vacuuming. Further, in U.S. Patent No.

5,377,375 to Holman et al. disclosed is a stair cleaning device having three cleaning heads that can be operated either horizontally or vertically in order to clean the run or the rise of the step respectively. Again, Holman et al. does not have the capability or teaches a way to accommodate the toe portion overhang of the step run.

[0005] What is needed, is a simple and inexpensive surface cleaning device that can effectively accommodate the "toe" portion of the step being between the rise and the run of the step, even when the "toe" is overhung in relation to the adjacent step rise. In addition, the surface cleaning device would include the capability to accommodate different outside radii or convex / concave surface profile configurations of the "toe" portion of the step with easy interchangeability for different surface or "toe" profiles, that could also include, for example different furniture arm profiles or other similar surface or fabric / upholstery / carpet profiles that need cleaning. Also, the surface cleaning device should have the option of incorporating solution / steam cleaning in combination with vacuum cleaning if desired by the user. Scrubbing bristles could also be included along the concave / convex profile of the surface cleaning device that approximately match in sur-

face profile the convex / concave profile of the surface to be cleaned for more effective cleaning by raising the fabric nap or scrubbing the surface prior to the vacuum and / or steam cleaning.

SUMMARY OF INVENTION

[0006] Broadly, the present invention is a surface cleaning device adapted for use with a vacuum cleaner nozzle inlet to clean a selected surface profile. The surface cleaning device includes a housing with a surrounding sidewall positioned about a housing longitudinal axis to define a housing interior separated from an exterior environment. Also included is a divider disposed within the housing interior that is adjacent to the surrounding sidewall. The divider is oriented approximately perpendicular to the housing longitudinal axis such that the housing interior is separated into a first housing interior and a second housing interior. The housing surrounding sidewall terminating in a first opening communicating between the first housing interior and the exterior environment and a second opening communicating between the second housing interior and the exterior environment. The first opening is approximately matched in profile to the selected surface profile to be cleaned and the second opening is approximately

matched in profile to another selected surface profile to be cleaned.

[0007] Further included is a divider aperture collar that is adjacent to the divider forming a fluid communication therethrough the divider between the first housing interior and the second housing interior. The divider aperture collar is positioned lengthwise to be substantially parallel to the housing longitudinal axis, with the divider aperture collar being sized and configured to be removably engagable to the vacuum cleaner nozzle inlet to create a substantially fluid tight communication selectively between either the first housing interior and the vacuum cleaner nozzle inlet or the second housing interior and the vacuum cleaner nozzle inlet.

[0008] These and other objects of the present invention will become more readily appreciated and understood from a consideration of the following detailed description of the exemplary embodiment(s) of the present invention when taken together with the accompanying drawings, in which;

BRIEF DESCRIPTION OF DRAWINGS

[0009] Figure 1 shows a perspective view assembly of the surface cleaning device assembly embodiment for vacuum and solution cleaning;

- [0010] Figure 2 shows an exploded perspective view of the surface cleaning device assembly embodiment for vacuum cleaning;
- [0011] Figure 3 shows an exploded perspective view of the surface cleaning device assembly embodiment for vacuum and solution cleaning;
- [0012] Figure 4 shows a side elevation view of the surface cleaning device embodiment for vacuum and solution cleaning;
- [0013] Figure 5 shows a side elevation view of the surface cleaning device embodiment for vacuum cleaning;
- [0014] Figure 6 shows an end view of the surface cleaning device embodiment for vacuum cleaning;
- [0015] Figure 7 shows an end view of the surface cleaning device embodiment for vacuum and solution cleaning;
- [0016] Figure 8 shows crossectional view 8-8 from Figure 5 for the housing not including the vacuum cleaner hose distal end;
- [0017] Figure 9 shows crossectional view 9-9 from Figure 5 for the housing including the vacuum cleaner hose distal end removed from the housing for clarity;
- [0018] Figure 10 shows crossectional view 10-10 from Figure 1 for the housing including the adapter and the vacuum and solution cleaner hose distal end removed from the adapter

for clarity;

- [0019] Figure 11 shows crossectional view 11-11 from Figure 6 for the housing including the vacuum cleaner hose distal end and hose;
- [0020] Figure 12 shows crossectional view 12-12 from Figure 7 for the housing including the adapter and the vacuum and solution cleaner hose distal end and hose; and
- [0021] Figure 13 shows a perspective use view of the surface cleaning device assembly embodiment for vacuum cleaning the surface of the toe portion of a step.

[0022] *REFERENCE NUMBER IN DRAWINGS*

- [0023] 20 Surface cleaning device assembly embodiment for vacuum cleaning
- [0024] 22 Surface cleaning device assembly embodiment for vacuum and solution cleaning
- [0025] 24 Housing
- [0026] 26 Housing longitudinal axis
- [0027] 28 First housing interior
- [0028] 30 Second housing interior
- [0029] 32 Housing surrounding sidewall terminal first opening
- [0030] 33 Terminal first opening continuously curved perimeter

surface

- [0031] 34 Housing surrounding sidewall terminal second opening
- [0032] 35 Terminal second opening continuously curved perimeter surface
- [0033] 36 Exterior environment
- [0034] 37 Terminal first opening concave sections
- [0035] 38 Housing surrounding sidewall
- [0036] 39 Terminal first opening convex sections
- [0037] 40 Divider
- [0038] 41 Terminal second opening concave sections
- [0039] 42 Divider aperture collar
- [0040] 43 Terminal second opening convex sections
- [0041] 44 Housing bristles
- [0042] 46 Housing bristles retainer
- [0043] 48 Vacuum fluid flow with contaminants
- [0044] 49 Vacuum fluid flow with solution and contaminants
- [0045] 50 Cleaning solution fluid flow
- [0046] 52 Vacuum cleaner hose distal end

- [0047] 54 Vacuum cleaner hose
- [0048] 56 Vacuum and solution cleaner hose distal end
- [0049] 58 Vacuum and solution cleaner hose
- [0050] 60 Vacuum and solution cleaner hose barrier
- [0051] 62 Vacuum and solution cleaner hose distal end vacuum portion
- [0052] 64 Vacuum and solution cleaner hose distal end solution portion
- [0053] 66 Housing rotational arrows
- [0054] 68 Adapter between vacuum and solution cleaner hose distal end and housing
- [0055] 70 Adapter proximal end portion
- [0056] 72 Adapter distal end portion
- [0057] 74 Adapter vacuum channel
- [0058] 76 Solution spray nozzle
- [0059] 78 Stair rise portion
- [0060] 80 Stair run portion
- [0061] 82 Stair toe portion
- [0062] 84 Surface to be cleaned or selected surface profile

[0063] 86 Stair corner portion

DETAILED DESCRIPTION

[0064] With initial reference to Figures 1–13, Figure 1 shows a perspective view assembly of the surface cleaning device assembly 22 embodiment for vacuum and solution cleaning, Figure 2 shows an exploded perspective view of the surface cleaning device assembly embodiment 20 for vacuum cleaning, and Figure 3 shows an exploded perspective view of the surface cleaning device assembly 22 embodiment for vacuum and solution cleaning. Figure 4 shows a side elevation view of the surface cleaning device 22 embodiment for vacuum and solution cleaning, Figure 5 shows a side elevation view of the surface cleaning device 20 embodiment for vacuum cleaning, and Figure 6 shows an end view of the surface cleaning device 20 embodiment for vacuum cleaning. Figure 7 shows an end view of the surface cleaning device 22 embodiment for vacuum and solution cleaning, Figure 8 shows cross-sectional view 8–8 from Figure 5 for the housing 24 not including the vacuum cleaner hose distal end 52, and Figure 9 shows cross-sectional view 9–9 from Figure 5 for the housing 24 including the vacuum cleaner hose distal end

52 removed from the housing 24 for clarity. Figure 10 shows crossectional view 10-10 from Figure 1 for the housing 24 including the adapter 68 and the vacuum and solution cleaner hose distal end 64 removed from the adapter 68 for clarity, Figure 11 shows crossectional view 11-11 from Figure 6 for the housing 24 including the vacuum cleaner hose distal end 52 and hose 54, and Figure 12 shows crossectional view 12-12 from Figure 7 for the housing 24 including the adapter 68 and the vacuum and solution cleaner hose distal end 56 and hose 58. Figure 13 shows a perspective use view of the surface cleaning device assembly 20 embodiment for vacuum cleaning the surface 84 of the toe portion 82 of a step in conjunction with a stair rise portion 78 and stair run portion 80.

- [0065] The surface cleaning device 20 embodiment that is adapted for use with a vacuum cleaner nozzle inlet or distal end 52 to clean a selected surface 84 profile, includes a housing 24 with a surrounding sidewall 38 positioned about a housing 24 longitudinal axis 26 to define a housing interior, being 28 and 30 separated from an exterior environment 36.
- [0066] Also included for the surface cleaning device 20 embodiment is a divider 40 disposed within the housing 24 inte-

rior 28 and 30 and adjacent to the surrounding sidewall 38, the divider 40 is oriented approximately perpendicular to the housing 24 longitudinal axis 26 such that the housing 24 interior 28 and 30 is separated into a first housing 24 interior 28 and a second housing 24 interior 30. The housing 24 surrounding sidewall 38 terminates in a first opening 32 communicating between the first housing 24 interior 28 and the exterior environment 36 and a second opening 34 communicating between the second housing 24 interior 30 and the exterior environment 36. The first opening 32 is approximately matched in profile to the selected surface profile 84 to be cleaned and the second opening 34 is approximately matched in profile to another selected surface profile 84 to be cleaned. The selected surface profile 84 to be cleaned can be any profile possible, for example a convex profile 82 or a concave profile 86, only requiring that the first opening 32 or the second opening 34 be approximately matched in profile to the selected surface profile. For example, a first opening 32 being concave to clean a convex selected surface profile 84.

[0067] Further included in the surface cleaning device 20 is a divider 40 aperture collar 42 that is adjacent to the divider

40 forming a fluid communication therethrough the divider 40 between the first housing 24 interior 28 and the second housing 24 interior 30. The divider 40 aperture collar 42 is positioned lengthwise to be substantially parallel to the housing 24 longitudinal axis 26. The divider 40 aperture collar 42 is sized and configured to be removably engagable to the vacuum cleaner nozzle inlet or distal end 52 to create a substantially fluid tight communication 48 selectively between either the first housing 24 interior 28 and the vacuum cleaner nozzle inlet or distal end 52, or the second housing 24 interior 30 and the vacuum cleaner nozzle inlet or distal end 52. Note that this selectivity between the either the first housing 24 interior 28 and the vacuum cleaner nozzle inlet or distal end 52, or the second housing 24 interior 30 and the vacuum cleaner nozzle inlet or distal end 52 is accomplished by rotating 66 the housing 24 one hundred and eighty degrees or a half turn when the housing 24 is removed from the vacuum cleaner nozzle inlet or distal end 52 (see Figure 9) and then subsequently removably engaging the vacuum cleaner nozzle inlet or distal end 52 into the divider 40 aperture collar 42 (see Figure 11).

[0068] Also, optionally the first opening 32 can have a plurality of

bristles 44 disposed upon the first opening 32. The bristles 44 can be retained by a bristles 44 retainer 46 by compression clamping the root of the bristle 44, or adhesives, and the like. Further, optionally the second opening 34 can have a plurality of bristles 44 disposed upon the second opening 34. The bristles 44 can be retained by a bristles 44 retainer 46 by compression clamping the root of the bristle 44, or adhesives, and the like.

[0069] Going into further detail on the first opening 32, the first opening 32 can optionally have a continuously curved perimeter surface 33 defining the first opening 32 that includes oppositely disposed concave 37 sections and oppositely disposed convex 39 sections. Wherein the concave 37 and convex 39 sections are continuous, and the concave 37 or convex 39 sections are approximately matched in profile to the selected surfaces 84 to be cleaned that have a respective convex 82 or concave 86 profile. Also, optionally the first opening 32 that has a continuously curved perimeter surface 33 can have a plurality of bristles 44 disposed upon the first opening 32 that has a continuously curved perimeter surface 33. The bristles 44 can be retained by a bristles 44 retainer 46 by compression clamping the root of the bristle 44, or adhe-

sives, and the like.

[0070] Further, for the detail on the second opening 34, the second opening 34 can optionally have a continuously curved perimeter surface 35 defining the second opening 34 that includes oppositely disposed concave 41 sections and oppositely disposed convex 43 sections. Wherein the concave 41 and convex 43 sections are continuous, and the concave 41 or convex 43 sections are approximately matched in profile to the selected surfaces 84 to be cleaned that have a respective convex 82 or concave 86 profile. Also, optionally the second opening 34 that has a continuously curved perimeter surface 35 can have a plurality of bristles 44 disposed upon the second opening 34 that has a continuously curved perimeter surface 35. The bristles 44 can be retained by a bristles 44 retainer 46 by compression clamping the root of the bristle 44, or adhesives, and the like.

[0071] With respect the concave 37 and convex 39 sections and the concave 41 and convex 43 sections, four different selected surface profiles 84 can be cleaned with the use of a single surface cleaning device 20. With the aforementioned concave 37 and convex 39 sections and the concave 41 and convex 43 sections being able to approxi-

mately match two different convex 82 profile surfaces 84 to be cleaned and two different concave 86 profile surfaces 84 to be cleaned, with the use of a single surface cleaning device 20.

- [0072] The surface cleaning device 20, housing 24, divider 40, and divider aperture collar 42 are preferably constructed of materials selected from the group consisting essentially of polyethylene, polypropylene, and polyurethane materials or other similar type materials.
- [0073] The surface cleaning device 22 embodiment is adapted for use with a vacuum and solution cleaner nozzle inlet or distal end 56 to clean a selected surface 84 profile, includes a housing 24 with a surrounding sidewall 38 positioned about a housing 24 longitudinal axis 26 to define a housing interior, being 28 and 30 separated from an exterior environment 36.
- [0074] Also included for the surface cleaning device 22 embodiment is a divider 40 disposed within the housing 24 interior 28 and 30 and adjacent to the surrounding sidewall 38, the divider 40 is oriented approximately perpendicular to the housing 24 longitudinal axis 26 such that the housing 24 interior 28 and 30 is separated into a first housing 24 interior 28 and a second housing 24 interior

30. The housing 24 surrounding sidewall 38 terminating in a first opening 32 communicating between the first housing 24 interior 28 and the exterior environment 36 and a second opening 34 communicating between the second housing 24 interior 30 and the exterior environment 36. The first opening 32 is approximately matched in profile to the selected surface profile 84 to be cleaned and the second opening 34 approximately matched in profile to another selected surface profile 84 to be cleaned. The selected surface profile 84 to be cleaned can be any profile possible, for example a convex profile 82 or a concave profile 86, only requiring that the first opening 32 or the second opening 34 be approximately matched in profile to the selected surface profile. For example, a first opening 32 being concave to clean a convex selected surface profile 84.

[0075] Further included in the surface cleaning device 22 is a divider 40 aperture collar 42 that is adjacent to the divider 40 forming a fluid communication therethrough the divider 40 between the first housing 24 interior 28 and the second housing 24 interior 30. The divider 40 aperture collar 42 is positioned lengthwise to be substantially parallel to the housing 24 longitudinal axis 26.

[0076] Further included in the surface cleaning device 22 is an adapter 68 that includes a proximal end portion 70 and a distal end portion 72. The adapter 68 proximal end portion 70 is sized and configured to be removably engagable to the vacuum and solution cleaner nozzle inlet or distal end 56 with the adapter 68 distal end portion 72 being sized and configured to be removably engagable to the divider aperture collar 42. The adapter 68 also includes a vacuum channel 74 that forms a substantially fluid tight communication 48 selectively between either the vacuum cleaner nozzle inlet distal end portion 62 and the first housing 24 interior 28 or the vacuum cleaner nozzle inlet distal end portion 62 and the second housing 24 interior 30. The vacuum and solution hose 58 also includes a barrier 60 that separates the vacuum fluid flow 49 and the solution fluid flow 50 in the hose 58.

[0077] Note that this selectivity between the either the first housing 24 interior 28 and the adapter 68 distal end 72 or the second housing 24 interior 30 and the adapter 68 distal end 72 is accomplished by rotating 66 the housing 24 one hundred and eighty degrees or a half turn when the housing 24 is removed from the adapter 68 distal end 72 (see Figure 3) and then subsequently removably engage the

adapter 68 distal end 72 into the divider 40 aperture collar 42 (see Figure 12).

[0078] Also, optionally the first opening 32 can have a plurality of bristles 44 disposed upon the first opening 32. The bristles 44 can be retained by a bristles 44 retainer 46 by compression clamping the root of the bristle 44, or adhesives, and the like. Further, optionally the second opening 34 can have a plurality of bristles 44 disposed upon the second opening 34. The bristles 44 can be retained by a bristles 44 retainer 46 by compression clamping the root of the bristle 44, or adhesives, and the like.

[0079] Going into further detail on the first opening 32, the first opening 32 can optionally have a continuously curved perimeter surface 33 defining the first opening 32 that includes oppositely disposed concave 37 sections and oppositely disposed convex 39 sections. Wherein the concave 37 and convex 39 sections are continuous, and the concave 37 or convex 39 sections are approximately matched in profile to the selected surfaces 84 to be cleaned that have a respective convex 82 or concave 86 profile. Also, optionally the first opening 32 that has a continuously curved perimeter surface 33 can have a plurality of bristles 44 disposed upon the first opening 32

that has a continuously curved perimeter surface 33. The bristles 44 can be retained by a bristles 44 retainer 46 by compression clamping the root of the bristle 44, or adhesives, and the like.

[0080] Further, for the detail on the second opening 34, the second opening 34 can optionally have a continuously curved perimeter surface 35 defining the second opening 34 that includes oppositely disposed concave 41 sections and oppositely disposed convex 43 sections. Wherein the concave 41 and convex 43 sections are continuous, and the concave 41 or convex 43 sections are approximately matched in profile to the selected surfaces 84 to be cleaned that have a respective convex 82 or concave 86 profile. Also, optionally the second opening 34 that has a continuously curved perimeter surface 35 can have a plurality of bristles 44 disposed upon the second opening 34 that has a continuously curved perimeter surface 35. The bristles 44 can be retained by a bristles 44 retainer 46 by compression clamping the root of the bristle 44, or adhesives, and the like.

[0081] With respect the concave 37 and convex 39 sections and the concave 41 and convex 43 sections, four different selected surface profiles 84 can be cleaned with the use of a

single surface cleaning device 22. With the aforementioned concave 37 and convex 39 sections and the concave 41 and convex 43 sections being able to approximately match two different convex 82 profile surfaces 84 to be cleaned and two different concave 86 profile surfaces 84 to be cleaned, with the use of a single surface cleaning device 20.

[0082] The surface cleaning device 22, housing 24, divider 40, divider aperture collar 42, and adapter 68 are preferably constructed of materials selected from the group consisting essentially of polyethylene, polypropylene, and polyurethane materials or other similar type materials.

CONCLUSION

[0083] Accordingly, the present invention of a surface cleaning device assembly 20 and 22 has been described with some degree of particularity directed to the embodiment(s) of the present invention. It should be appreciated, though, that the present invention is defined by the following claims construed in light of the prior art so modifications or changes may be made to the exemplary embodiment(s) of the present invention without departing from the inventive concepts contained therein.